

Listing of Claims

1. (Original) A method for depositing an epitaxial thin film having the quaternary formula YCZN wherein Y is a Group IV element and Z is a Group III element on a substrate at temperature between ambient temperature and 1000°C in a gas source molecular beam epitaxial chamber, comprising introducing into said chamber:

- i. gaseous flux of precursor H_3YCN wherein H is hydrogen or deuterium;
and
- ii. vapor flux of Z atoms;
under conditions whereby said precursor and said Z atoms combine to form epitaxial YCZN on said substrate.

2. (Original) The method of Claim 1 wherein said temperature is about 550°C to 750°C.

3. (Original) The method of Claim 1 wherein said substrate is silicon or silicon carbide.

4. (Original) The method of Claim 3 wherein said substrate is Si(111) or α -SiC(0001).

5. (Original) The method of Claim 3 wherein said substrate is a large-diameter silicon wafer.

6. (Original) The method of Claim 5 wherein said silicon wafer comprises Si(111).

7. (Original) The method of Claim 4 wherein said substrate is α -SiC(0001) comprising the additional step of cleaning said substrate prior to deposition of said quaternary film.

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8. (Original) The method of Claim 7 wherein said cleaning step comprises hydrogen etching.

9. (Amended) The method of Claim 1 wherein said substrate is Si(111) comprising a buffer layer, and said epitaxial ~~semiconductor~~ YCZN is deposited on said buffer layer.

10. (Amended) The method of Claim 7 9 wherein said buffer layer is a Group III nitride.

11. (Amended) The method of Claim 8 10 wherein said buffer layer is AlN.

12. (Canceled)

13. (Canceled)

14. (Original) The method of Claim 1 wherein Y is silicon, germanium or tin.

15. (Original) The method of Claim 1 wherein Z is aluminum, gallium or indium.

16. (Original) The method of Claim 1 wherein Z is boron.

17. (Original) The method of Claim 1 for depositing thin film YCZN wherein Y is silicon and said precursor is H₃SiCN.

18. (Original) The method of Claim 1 for depositing the thin film YCZN wherein Y is germanium and said precursor is H₃GeCN.

19. (Original) The method of Claim 1 for depositing epitaxial thin film SiCZN on a substrate wherein said precursor is H₃SiCN, said Z atom is aluminum and said substrate is Si(111) or α-SiC(0001).

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20. (Original) The method of Claim 1 for depositing epitaxial thin film GeCZN on a substrate wherein said precursor is D_3GeCN , said Z atom is aluminum and said substrate is Si(111) or α -SiC(0001).

21-33. (Canceled)

34. (Amended) The method of Claim 1 for depositing epitaxial thin film having the formula $(YC)_{(0.5-x)}(ZN)_{(0.5+x)}$ wherein x is chosen to be a value $0 < x \leq 0.5$, and Z is the same or different in each occurrence, comprising in addition the step of introducing into said chamber a flux of nitrogen atoms and maintaining the flux of said precursor, said nitrogen atoms and said Z atoms at a ratio selected to produce quaternary semiconductors having said chosen value of x.

35-45. (Canceled)